

**REMARKS**

This Request for Reconsideration is filed in response to the final Office Action dated March 6, 2006. In view of these remarks, this application should be allowed and the case passed to issue.

Claims 1, 5-12, 16-21, 25, and 26 are pending in this application. Claims 1, 5-12, 16-21, 25, and 26 are rejected. Claims 2-4, 13-15, and 22-24 have been canceled.

***Claim Rejections Under 35 U.S.C. § 103***

Claims 1, 5, 7-10, 12, 16-18, 25, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada (JP 05-311425) in view of Zejda (U.S. Pat. No. 5,228,968). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the instant invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a sputter deposition apparatus comprising a chamber defining an interior space adapted to be maintained at a reduced pressure and at least one sputtering source in the chamber. Mounting means position a substrate/workpiece in the chamber for receipt of a sputtered particle flux from the at least one sputtering source. At least one gas supply means inject a gas into the chamber. The at least one gas supply means extends into the chamber and comprises a plurality of differently-sized outlet orifices adapted for providing substantially the same flow rate of gas from each orifice. The gas supply means comprises an inlet portion and an outlet portion including the plurality of differently-sized outlet orifices. The size of the outlet orifices progressively increases with distance from the inlet portion. The gas supply means is wishbone-shaped and comprises a linearly elongated, tubular inlet portion having first and second ends and a pair of arcuately shaped and tubular outlet

portions extending from the second end. The size of the outlet orifices of each of the arcuate outlet portions progressively increase with distance from the second end of the inlet portion.

Another aspect of the invention, per claim 7, is a sputter deposition apparatus comprising at least one gas supply means for injecting a gas into the chamber. The at least one gas supply means extends into the chamber and comprises a plurality of differently-sized outlet orifices adapted for providing substantially the same flow rate of gas from each orifice. The gas supply means comprises an inlet portion and an outlet portion including the plurality of differently-sized outlet orifices. The size of the outlet orifices progressively increase with distance from the inlet portion. The gas supply means is ring-shaped and comprises a linearly elongated, tubular inlet portion having first and second ends and a substantially circularly-shaped outlet portion extending from the second end. The size of the plurality of outlet orifices of the outlet portion progressively increases with distance from the second end of the inlet portion.

Another aspect of the invention, per claim 12, is a method of forming a thin film on a substrate/workpiece by sputtering comprising the steps of providing an apparatus comprising a vacuum chamber including at least one sputtering source and a gas supply means for injecting a gas containing at least one reactive component into the chamber. The gas supply means comprises a plurality of differently-sized outlet orifices adapted for providing substantially the same flow rate of gas from each orifice. The apparatus is provided with a substrate/workpiece having at least one surface for formation of a thin film thereon. A sputtered particle flux is generated from the at least one sputtering source. The gas containing at least one reactive component is injected into the chamber via the gas supply means, such that substantially the same gas flow rate is provided at each orifice. A reactively sputtered thin film is formed on the at least one surface of the substrate/workpiece. The reactively sputtered thin film has a

substantially uniform content of the at least one reactive component. The gas supply means comprises an inlet portion and an outlet portion including the plurality of differently-sized outlet orifices. The size of the outlet orifices progressively increases with distance from the inlet portion. The gas supply means is wishbone-shaped and comprises a linearly elongated, tubular inlet portion having first and second ends and a pair of arcuately shaped tubular outlet portions extend from the second end. The size of the outlet orifices of each of the arcuate outlet portions progressively increase with distance from the second end of the inlet portion.

Another aspect of the claimed invention, per claim 17, is a method of forming a thin film on a substrate/workpiece by sputtering comprising the step of providing an apparatus comprising a vacuum chamber including at least one sputtering source and a gas supply means for injecting a gas containing at least one reactive component into the chamber. The gas supply means comprises a plurality of differently-sized outlet orifices adapted for providing substantially the same flow rate of gas from each orifice. The gas supply means comprises an inlet portion and an outlet portion including the plurality of differently-sized outlet orifices. The size of the outlet orifices progressively increase with distance from the inlet portion. The gas supply means is ring-shaped and comprises a linearly elongated and tubular inlet portion having first and second ends. A substantially circularly-shaped outlet portion extends from the second end. The size of the outlet orifices of the outlet portion progressively increase with distance from the second end of the inlet portion.

The Examiner asserted that Yamada discloses a sputtering method and apparatus wherein the gas supply means 3 comprises a plurality of differently sized holes 5A, 5B, 5C, and 5D to provide the same flow rate over the whole range of the vacuum vessel. The size of the outlets progressively increases with distance from the inlet portion. The Examiner averred that Yamada

teaches a wishbone shape and that the arcuate shapes of the gas supply means, including a ring shaped gas supply are disclosed by Zejda. The Examiner concluded that it would have been obvious to modify Yamada to include an arcuate wishbone-shaped or ring-shaped gas supply means with progressively increasing outlet orifices because it allows for increasing the evenness of the coating on the substrate and coating uniformity.

Yamada and Zejda, whether taken in combination, or alone, however, do not suggest the claimed apparatus and method. Yamada do not disclose a wishbone-shaped gas supply means with a pair of arcuately-shaped tubular outlet portions. As disclosed in Fig. 1, the gas supply means of Yamada et al. is a squared U-shape, not wishbone-shaped with a pair of arcuately-shaped tubular outlet portions. Zejda does not disclose gas supply means comprising a plurality of differently sized outlet orifices.

Furthermore, there is insufficient motivation to combine the Zejda with Yamada as asserted by the Examiner. There is no suggestion in Yamada or Zejda that even gas flow and uniform coatings would result from arcuate wishbone-shaped and ring-shaped gas supply means, wherein the size of the outlet orifices of each of the arcuate outlet portions progressively increasing with distance from the second end of the inlet portion. There is no suggestion in these references that very different geometries of gas supply means would provide even gas flow and uniform coating.

Thus, Yamada and Zejda do not suggest a sputter deposition apparatus comprising a wishbone-shaped gas supply means comprising a linearly elongated, tubular inlet portion having first and second ends, a pair of arcuately-shaped, tubular outlet portions extending from the second end, wherein the size of the outlet orifices of each of the arcuate outlet portions progressively increasing with distance from the second end of the inlet portion, as required by

claim 1. Yamada and Zejda further do not suggest a sputter deposition apparatus comprising the ring-shaped gas supply means comprising a linearly elongated, tubular inlet portion having first and second ends, and a substantially circularly-shaped outlet portion extending from the second end, the size of the plurality of outlet orifices of the outlet portion progressively increasing with distance from the second end of the inlet portion, as required by claim 7. Yamada and Zejda also do not suggest, a method of forming a thin film including the step of providing a gas supply means, wherein the gas supply means is wishbone-shaped and comprises a linearly elongated, tubular inlet portion having first and second ends and a pair of arcuately shaped, tubular outlet portions extending from the second end, the size of the outlet orifices of each of the arcuate outlet portions progressively increasing with distance from the second end of the inlet portion, as required by claim 12. In addition, Yamada and Zejda do not suggest the method of forming a thin film including the step of providing a ring-shaped gas supply means comprising a linearly elongated, tubular inlet portion having first and second ends, and a substantially circularly-shaped outlet portion extending from the second end, wherein the size of the outlet orifices of the outlet portion progressively increases with distance from the second end of the inlet portion, as required by claim 17.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Yamada or Zejda to modify the sputtering apparatus and method of Yamada to

include a gas supply means with an arcuate wishbone- or ring-shaped outlet with outlet orifices progressively increasing in size, as required by claims 1, 7, 12, or 17.

The requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and realistically impel one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically claimed invention. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989).

Accordingly, the Examiner is charged with the initial burden of identifying a source in the applied prior art for the requisite realistic motivation. *Smiths Industries Medical System v. Vital Signs, Inc.*, 183 F.3d 1347, 51 USPQ2d 1415 (Fed. Cir. 1999); *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1449 (Fed. Cir. 1997). There is no motivation in Yamada and Zejda to modify the sputtering apparatus of Yamada so that it has the arcuate wishbone- or ring-shaped gas supply means as required by claims 1, 7, 12, or 17.

In rejecting a claim under 35 U.S.C. § 103, the Examiner is required to discharge the initial burden by, *inter alia*, making "**clear and particular**" factual findings as to a **specific understanding** or **specific technological principle** which would have **realistically** impelled one having ordinary skill in the art to modify an applied reference to arrive at the claimed invention based upon facts, -- not generalizations. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); *Ecolochem Inc. v. Southern California Edison, Co.*, 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); *In re Kotzab, supra*; *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). That burden has not been discharged, as the Examiner has provided no factual basis for modifying the Yamada sputtering apparatus or method to include the arcuate wishbone- or ring-shaped gas supply means, as required by claims 1, 7, 12, or 17.

The only teaching of the sputter deposition apparatus and method comprising a gas supply means with an arcuate wishbone- or ring-shaped outlet with outlet orifices progressively increasing in size is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The motivation for modifying the prior art must come from the prior art and must be based on facts.

The dependent claims are allowable for at least the same reasons as the respective independent claims from which they depend and further distinguish the claimed invention. For example, claims 25 and 26 further require that the outlet orifices of the circularly- and ringed-shaped outlet portions face the substrate/workpiece. The cited references do not suggest a plurality of circularly- and ringed-shaped gas supply means comprising outlet orifices facing the substrate/workpiece wherein the outlet orifices progressively increase with distance from the inlet portions.

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Zejda and Latz (U.S. Pat. No. 5,167,789). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the instant invention, as claimed, and the cited prior art.

The Examiner asserted that Yamada and Zejda substantially disclose the claimed sputter deposition apparatus and method except Yamada and Zejda do not disclose the plurality of outlet orifices facing away from the central space. The Examiner averred that it would have been obvious to have the orifices face away from the central space as taught by Latz because it allows for stable operation of a reactive sputtering system.

Initially, it is noted that Latz, U.S. Patent No. 5,167,789, has not been cited on a PTO-892 form by the Examiner. Applicants respectfully request that the Examiner cite this patent on a PTO-892 Notice of References Cited form and include the PTO-892 form with the next official action.

Yamada, Zejda, and Latz, whether taken in combination, or alone, however, do not suggest the claimed sputter deposition apparatus because Latz do not cure the deficiencies of Yamada. Latz does not suggest the arcuate wishbone-shaped gas supply means comprising outlet orifices progressively increasing in size, as required by claim 1. Contrary to the Examiner's assertion, there is no suggestion in Latz that having the orifices facing away from the central space allows for stable operation of reactive sputtering systems. Latz expressly discloses:

It is the object of the present invention to create a system for the stable operation of complex, reactive sputtering processes. . . .

This object is achieved in accordance with the invention in that the target has two parallel, substantially elongated, parallelepipedal portions, the ends of the two portions being connected by two arcuate target portions and forming with the latter a ring-shaped or oval target. The target is surrounded by a dark-space shielding whose circumferential margin facing the substrate overreaches the cathode tub such that the margin shields a narrow area of the end face of the cathode tub facing the substrate, but the margin extends at an insulating distance from the cathode tub. A magnet system disposed in the cathode tub and held on a yoke is formed of a central series of narrow magnets extending in the lengthwise direction of the target, and an additional endless series of narrow magnets disposed on the marginal portion of the yoke.

(page 2, lines 21 to 44). There is no suggestion in Latz that stable operation of the reactive sputtering systems is due to the orifices facing away from the central space.

Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Zejda and Hassan et al. (U.S. Pat. No. 4,270,999). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the instant invention, as claimed, and the cited prior art.



An aspect of the invention, per claim 11, is a sputter deposition apparatus comprising at least one gas supply means for injecting a gas into the chamber. The at least one gas supply means extends into the chamber and comprises a plurality of differently-sized outlet orifices adapted for providing substantially the same flow rate of gas from each orifice. The gas supply means comprises an inlet portion and an outlet portion including the plurality of differently-sized outlet orifices. The size of the outlet orifices progressively increase with distance from the inlet portion. Each of the plurality of outlet orifices is circularly-shaped and each outlet orifice comprises a plug with a central opening extending therethrough defining the diameter of the orifice.

The Examiner asserted that Yamada and Zejda substantially disclose the claimed sputter deposition apparatus and method except Yamada and Zejda do not disclose the plug. The Examiner averred that it would have been obvious to substitute the plug of Hassan et al. into the apparatus of Yamada and Zejda because it allows for controlling the flow rate of the gas.

It would not have been obvious to combine Hassan et al. with Yamada and Zejda because Hassan et al. is directed to non-analogous subject matter. Hassan et al. is directed to a dry etching apparatus. One of ordinary skill in this art would not look towards a dry etching apparatus to solve a problem in sputter deposition apparatus. As is well known in these arts, sputter deposition involves depositing material on a substrate, while dry etching involves removing material from the substrate.

"In order to rely on a reference as a basis for rejection of applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oeticker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Hassan et al. is neither directed to

the field of Applicants' endeavor, sputter deposition, nor pertinent to the problem with which Applicants were concerned, uniform coating of a sputter deposited layer.

Claims 19-21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Zejda and Suzuki et al. (U.S. Pat. No. 6,627,253). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the instant invention, as claimed, and the cited prior art.

The Examiner asserted that Yamada and Zejda substantially disclose the claimed method and magnetic recording media except for depositing a cobalt based alloy with oxide. The Examiner averred that it would have been obvious to deposit a cobalt-based alloy and an oxide as taught by Suzuki et al. to provide a magnetic medium with low media noise, high S/N ratio and high reliability to corrosion.

Yamada, Zejda, and Suzuki et al., whether taken in combination, or alone, however, do not suggest the claimed sputter deposition method and magnetic recording media because Suzuki et al. do not cure the deficiencies of Yamada and Zejda. Suzuki et al. do not suggest the arcuate wishbone-shaped gas supply means comprising outlet orifices progressively increasing in size, as required by claim 12.

### ***Response to Arguments***

Yamada and Zejda do not suggest arcuate- or ring- shaped gas delivery means with a plurality of differently-sized outlet orifices. There is no suggestion in Yamada and Zejda that an arcuate- or ring- shaped gas delivery means with a plurality of differently-sized outlet orifices would provide uniform coatings.

Although gas flows in both the Hassan apparatus and the Yamada and Zejda apparatuses, the flowing gas in Hassan is a etchant. Etchants remove material from a substrate surface. On

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the other hand, Yamada and Zejda are directed to sputtering apparatuses. The sputtering apparatuses of Yamada and Zejda deposit material on a substrate, while the apparatus of Hassan removes material from substrate.

In view of the above remarks, Applicants submit that this case should be allowed and passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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